

# **Cosmic-Ray Multi-Error Immunity for SRAM, Based on Analysis of the Parasitic Bipolar Effect**

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This paper describes an investigation of cosmic-ray-induced multi-cell error behavior in SRAMs through device- and circuit-level simulation methods developed on the basis that a parasitic bipolar effect is responsible for such errors. The first demonstration that the maximum number of cell errors per cosmic-ray strike depends on the number of cells between well contacts ( $N_c$ ) is presented. The results are applied in an ECC design guideline, which reduced SER for an SRAM by 88%.